

NASA TECH BRIEF

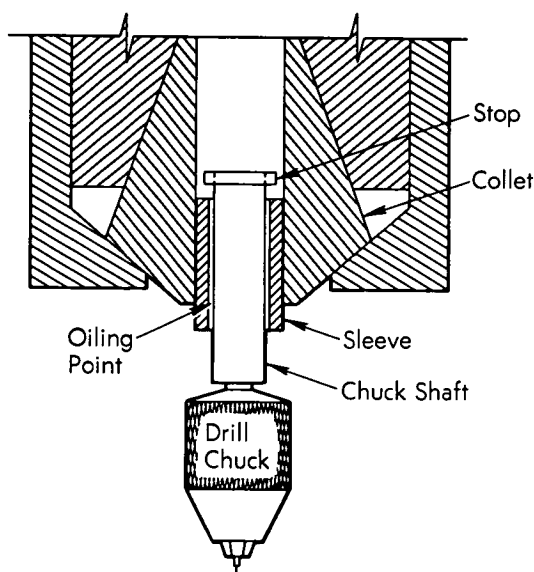
Ames Research Center



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Chuck for Delicate Drills

A drill rigidly fastened to a rotating spindle is broken when the power source can apply more turning force than can be tolerated by the material from which the drill is made. Drills smaller than No. 80



are particularly delicate and can be shattered even when driven by small motors; in particular, breakage is nearly inevitable when a small drill is held in a pin vise and chucked or colletted in the drive spindle of a large machine, especially since it is difficult to sense the pressure placed on the tip of the drill.

The assembly shown in the diagram utilizes an oil film to couple power between the drive spindle and the drill chuck. The chuck shaft is machined to a sliding fit for a sleeve of convenient diameter; the upper part of the chuck shaft is equipped with a stop, which may be a pin, washer, or screwed-on cap. The inter-

face between the chuck shaft and the sleeve is kept generously lubricated with oil; a low viscosity oil is usually sufficient, but higher viscosities may be required to transfer more power from the sleeve to the chuck.

The weight of the chuck and its shaft usually provides sufficient pressure for small drills, but additional cutting pressure can be obtained by adding weight to the chuck or to the top of the shaft. In any event, the speed of rotation of the chuck should be kept low, and the weight of the chuck and its shaft should be at a minimum for a given drill in order to keep "fly-wheel" energy storage below that required to break the drill. When all factors have been properly controlled, sufficient pressure will be automatically applied to the drill point; the chuck simply stops rotating when the drill jams.

The concept of using an oil film to transfer small amounts of energy is also applicable to other situations where delicate operations do not require positive power drives.

Note:

No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
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Patent status:

No patent action is contemplated by NASA.

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Category 07